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The electronic age brings with it new patterns for teaching and learning; educators and laymen need to orient themselves to be able to grasp and benefit from the new techniques. The beginnings of the explosion in learning are traced, starting with the printing press. Printed books altered patterns of study making it possible to read widely without having to memorize; printed books enabled the development of the classroom in which all students had access to the same data and texts. Today a similar revolution is taking place.

The technological explosion in learning creates a new frame of reference. The new electronic structures for teaching and learning are basically a return to the old Socratic dialogue, or to the fusion of teaching and learning functions. The presence of electronic information structures now dominating social and political thought and feeling makes the educational adjustment inevitable. Any new medium bombards older media and awareness, and the process is going on today in that the one-thing-at-a-time philosophy of print and mechanism is gradually being replaced by the all-at-once of the inclusive "field" of electricity. Books and films state things flatly and fully but suggest much less than the electric media. Television, on the other hand, states less than it suggests and deals with experience in depth. It gives light through a subject rather than on a subject; the viewer, or student, has to complete the image himself to see what is on the other side.

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INSTRUCTIONAL TECHNOLOGY - U.S.C.

ED002729

by Marshall McLuhan

"The artist," wrote Wyndham Lewis, "is engaged in writing a detailed history of the future because he is aware of the developed possibilities of the present." It is quite literally true that since printing it has been the poets and painters who have explored and predicted the various possibilities of print, of prints, of press, of telegraph, of photograph, movie radio and television. In recent decades the arrival of several new media has led to prodigious experimentation in the arts. But, at present, the artists have yielded to the media themselves. Experimentation has passed from the control of the private artist to the groups in charge of the new technologies.

That is to say, that whereas in the past the individual artist, manipulating private and inexpensive materials, was able to shape models of new experience years ahead of the public, today the artist works with expensive public technology, and artist and public merge in a single experience. The new media need the best artist talent and can pay for it. But the artist can no longer provide years of advance awareness of developments in the patterns of human experience which will inevitably emerge from new technological development.

The painters of the fifteenth century explained perspective on fixed point of view to the public when print was scarcely known. Aretino became "the scourge of princes" when print was young, and long before the newspaper took up its inevitable opposition role. Petrarch developed the Sonnet as a mode of self-expression and of self-analysis before print and long before Montaigne revealed the artistic meaning of the printed page in his essays.

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In a word, the artist discerns the forms of technological change in their full cultural dimensions before the technicians actually take over.

But to-day, for the first time in human history, our technology includes an external projection of each of our senses. Nobody has considered the significance of this development which confers on our technology an inclusive organic relation to mankind for the first time. From the invention of the wheel and alphabet onwards, we have been accustomed to conceive technology as a progressive splintering and dissociation of what in nature is integral and organic. Thus the wheel was an abstraction from animal form, since a running animal is in a sense rotating. And the first movie ever made was of a running horse.

To-day radio, telegraph and T.V. have no moving parts. The electronic age abandons mechanism for the movement of light and information only. Viewed in the crudist quantitative terms, the shift from mechanism to electronics presents the character of total revolution. It is inconceivable that school and society alike should not receive the full impact of this change.

Looked at more closely, the electronic mode of shaping situations reveals its bias towards <u>field</u> structure. But even "field," preferred by physicists, can mislead by suggesting a flat, single plane. But a multi-dimensional field is intended, an "everyway roundabout with intrusions from above and below." Thus, for example, "point-of-view," so inevitable in print culture, is alien to electronic "field" and the affiliates of such "field." For point-of-view originates in the discovery of a fixed position

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as creating perspective, or vanishing point. It was this discovery in the fifteenth century that we associate with the end of medieval art. It was the same discovery taken up by map-makers and by navigators that made the world voyages possible. For prior to this discovery of space as homogeneous and linearly continuous, it was not known that one could simply proceed on and on in a straight line on a single plane. Mircea Eliade's The Sacred and the Profane (Harcourt Brace 1959) is a study of the contrasted ideas of space and time as between modern and pre-modern man. And Harold Gatty's Nature is Your Guide (Collins 1958) provides much illustration of pre-mechanical relation to time and space. The methods and procedures in organizing our lives in time and space which are still accepted as "natural" derive almost entirely from the introduction of mechanism into teaching and learning by means of the first teaching-machine which is the printed page.

In providing the first complete mechanization of an ancient handicraft, print created an explosion in learning in the sixteenth century. But the technology by which the mechanization of writing was achieved also invaded every phase of teaching and learning during the past five hundred years. It will repay us to consider, briefly, what happened, if only because we are to-day involved in a much greater technological change which concerns the nature of teaching and learning more pervasively than print ever did or could.

Basically, the mechanization of writing involved the inspired step of segmentation. Movable types are a kind of static

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analysis of the movements of the scribal hand. And whether we regard the differential calculus or assembly-lines, science and industry have since the sixteenth century, and until recently, extended the principle of segmentation to all procedures of investigation and of applied knowledge.

It is all the easier to observe the patterns of mechanical or print culture now that we have for more than a century (since the telegraph) lived with the new electronic patterns of knowledge and of human association. It may seem baffling that in the electronic age there should be such an increase of books and printing. But the same paradox occurred after printing had ended the constitutive role of manuscript and scribe. For everybody began to write a great deal after printing. And now that print has ceased to constitute the major basis for teaching and learning and is no longer the dominant technological form of our world, there is much more printing than ever before. So far as my studies have taken me, the reason for this is that a new medium splinters the older ones into a variety of new forms and roles. The typewriter merges composition, writing and print publication in a single act. To-day the book has many new roles and functions, as had the manuscript in the sixteenth and seventeenth centuries.

Here, then, is a brief indication of the new patterns that entered teaching and learning as a result of printing. There was first, uniformity and repeatability which conferred the power of speed and silence on the reader. The manuscript was read slowly and aloud. The speed, uniformity, and repeatability of

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the printed book entirely altered patterns of study. It was then possible for the first time to read widely. And repeatability and accessibility of the book made it unnecessary to memorize all that one read as the manuscript reader had tended to do for purely practical reasons.

For the inaccessibility and non-repeatability of the manuscript made memorizing a need as it made oral learning and disputation a natural thing, capable of much greater speed and range than manuscript reading could achieve. (To-day we encounter the reverse situation in which film, videotape and even photography permit the rapid grasp of complex cultural gestalts, past and present, which the printed word cannot convey even slowly.)

The portability of the book, shared with its repeatability and cheapness, created on the one hand the habit of privacy and silence, and on the other hand made possible the class room in which all have ready for use the same data and texts. By contrast, the pre-print class room expended much time in enabling each student to make his own text while the teacher did aloud the work of the ancient exegete and the modern editor. All kinds of rhetorical analysis, word by word, went hand in hand with minute considerations of variant readings and punctuation. (See Baldwin's Small Latin and Lesse Greek.) Thus there arose from print a new kind of corporate life in the school and a new kind of privacy in the study. The curriculum was revolutionized to include a great range of authors and several languages, such as never could have been encompassed by manuscript means.

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But print at once gathered another group of changes, namely the related habits of self-expression and self-investigation. Print as a mass medium offered a sort of launching pad for the projection of the private person into the role of public institution. Pietro Aretino and Rabelais were perhaps the first to explore these new dimensions for the individual ego. Ego enlargement via print, at the same time created the sense of fame and self-perpetuation by means of the repeatability and indestructibility as it were of the private self. Marlowe's Tamburlaine and his Doctor Faustus are excellent types of the new megalomania arising from print.

Publication for Chaucer, by contrast, meant only a private reading of his work to friends. Self-expression and self-portraiture and self-analysis swiftly merged in the sixteenth century in the great figure of Montaigne. He revealed another feature inherent in the segmental analytic patterns of print, namely "systematic doubt." After Montaigne, print laid few further patterns on the private self and began to release its powers in the re-shaping of society and politics as the newspaper developed.

There is scarcely a feature of print culture which can to-day be discerned in the over-all field of our new electronic technology. Static fragmentation as a means of analysis and of production and expression are not to be found. Jacques Barzun in his House of Intellect, which he assures us is built on the alphabet (and print), has provided a handy testimony of the total incompatibility of the new age with the typical values and procedures of the print age. Art, science and philanthropy to-day, he says,

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represent a team destructive of all intellectual values. (He is careful to dissociate intellect from intelligence.) Perhaps he might have written a different book had he understood the private and social consequences of print as print. For one of the curiosities of print and literature is an obsession with "content" as opposed to "form." It is easy to see why the blank page awaiting an imprint should appear to "contain" things of good or ill use and report. It is in fact this formal, structural aspect of the page that obliterates awareness of the page itself as a structure. To a lesser degree, this oblivion of the structure of the page, and of print itself, extends to writing in the ancient world as well. For the alphabetic translation of the audible into the visible had huge consequences such as mark off Greece and Rome from all other societies which lacked phonetic means of codifying and translating experience into analytic, visible terms.

Let us suppose for a moment that a team of present-day testers had been available in the year 1500 to find out whether the new book or reading machines and instructional materials were capable of doing the plenary traditional job of education in the future. Would not this team, even as it would to-day, ask whether the privately read word could measure up as a means of teaching and learning to the memorized manuscript and its formidable extension in oral exegesis and group disputation? Since we know that printing wiped out the educational procedures of the preceding centuries, we can say that the testers would have been quite wrong in asking whether the new could compete with the old when the new had only one mode of procedure, namely to erase and

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to brainwash the older culture. Our testers to-day are still geared to the static assumptions of the print form and ignore the structural dynamics of the electronic form. In 1500, as in 1960, they could report variations in the facility with which educational skills in a wide range of subjects are achieved by print or by ETV. But they have no regard for the new patterns of perception and sensibility which are subliminally imposed on us all by new structures for codifying and moving information. For the new structures modify our means of apprehending past and present. They re-create our sense of space and time, of teaching and learning. Basically I should say that in the electronic situation there is great new stress on learning (creativity) and a corresponding relaxation of teaching stress.

Again let the artists of the last ten decades be our guide. The Romantics reacted strongly against the book as book, spotting it as the enemy of nature and of natural modes of learning. They insisted upon the creative imagination as the birthright of all, and began a ceaseless quest for the inclusive and integral Image. This arduous search was taken up with great intensity by the Symbolists who realized that it could not be a merely visual image, but must include all the senses in a kind of dance. En route to this discovery, Hopkins and Browning, Poe and Baudelaire, ended the print-fostered dichotomy between author and reader, producer and consumer and swept mostly unwilling audiences up into participation in the creative act. After Poe, and since Cézanne, poets and painters devised ever new modes of speaking not to their readers and viewers, but through them. As the voice of art resonated within and through the print-cultured audiences, the cry

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went up, and still continues: "the artist is using a private language." The artists' demand that the audiences enter the artist role as co-creators was not welcome to the consumer mind. Such is the meaning of the abstract art and the do-it-yourself kits which artists have for a hundred years been carefully preparing for their affronted public.

Of course, children love abstract and symbolist art, and experimental films. But by the time they have been given in late adolescence the cookie cutter patterns of the House of Intellect they freeze up in the presence of the playfully abstract cartoons of Picasso and James Joyce.

That situation is easy to understand. The educational establishment is also built on print and abced-mindedness. But to-day we are asking what will be the shape of things to come educationally. The answer is simple. The artists have told us in minute detail this past hundred years. They have built endless models of our challenge and our needs, and of how to live with the new instructional materials. They have told us that there will be no more consumer packages in education--not at least if education is to have a relevance to our new world. The dialogue will replace the guided tours of data provided by the book as teaching machine. In the dialogue there is no maintaining of a point of view, but only the common participation in creating perpetually new insight and understanding in a total field of unified awareness. For dialogue is not light <u>on</u>, but light <u>through</u>, which is the difference between film and T.V.

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Let us note that in all forms of electric circuit and appliance, whether telegraph radar or guided missile, we are confronted with the give and take of dialogue and not the one way song of lyric self-expression. Even the various forms of electric appliance impose a large measure of do-it-yourselfness, whether the electric toaster, the vacuum-cleaner or the washing-machine.

I say, therefore, with impersonal assurance, that unless we choose to abandon all electric forms of technology we cannot possibly retain in our teaching and learning the modes of instruction and apprehension associated with the mechanical forms of print and its innumerable cultural progeny. Even if we are zealous, like Dean Barzun to retain and to maintain the characteristics of print-culture we shall need to know much more than he does about the cultural dynamics of print in individual society; and also it would be necessary to have a very complete knowledge of the new dynamics of our new technology in order to harmonize the twain. It is characteristic of the semi-aware products of print culture that they prefer to take a strong moral stand on one or another horn of a dilemma. They love dichotomies. They point with pride. They view with alarm. They then feel that duty has been done by spiritual values. But of understanding and, therefore, of control of new situations they are bereft.

I am not optimistic about saving any of the traditional qualities in education from the electronic bombardment. It could be done by those who had a firm hold of both old and new situations. And since those of the older print-culture are not morally or mentally prepared to tackle the new, it behooves the

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products of the new electronic culture to seize and to maintain some of the needful qualities from the wreck of the House of Intellect. If this sounds like Robinson Crusoe revisiting the wreck, it will be a Robinson Crusoe equipped with electronic technology.

Earlier I listed some of the basic characters and consequences of printing in teaching and learning. It seemed a useful way of moving from the known to the less well known. I have insisted that any new structure for codifying experience and of moving information, be it alphabet or photography, has the power of imposing its structural character and assumptions upon all levels of our private and social lives, even without benefit of concepts or of conscious acceptance. That is what I've always meant by "the medium is the message." Moreover, a new medium bombards older media and awareness, stripping the older forms of experience to their bare bones or basic codes. That is why, today, when we are already living through intense nuclear bombardment from within our own cultures, we have achieved almost total clairvoyance of our own condition and of our debts to earlier ages. To-day, we master languages and whole cultures faster than men formerly mastered an author. Our children live in a world museum of cultures from infancy, even while we continue to educate them as if they were bolted into only one of these cultures. And these changes, or this acceleration of change to the point where change itself becomes the very matrix and foundation of society--all this is owing to our century-old shift into the electronic mode of information shaping and movement. We have left the one-thing-at-a-time of print and mechanism for the all-at-once of the inclusive "field"

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of electricity. And it is the very structure of this all-at-once inclusive mode in teaching and learning which automatically ends what we till now called "subjects." The electronic alters the contours of math and physics and "nature" even as it abolishes literature. The nature with which we will henceforth be engagée is one whose lines of force we will travel and explore with the sensitivity of the greatest artists. The split between art and nature ends now, as surely as the division between culture and commerce. So far as the young are concerned, all these things are already accomplished. Their sensibilities have been formed almost entirely and exclusively by electronic modes of experience. Even the film, that last mechanical link with the Gutenberg era, they experience mostly as translated through the medium of T.V.

I put the matter this way in order to confront the educational point: "What is the difference between movie and T.V. after all?" Just to heat up the issue a bit more, let me answer that they have scarcely anything in common except the fact that both are visible. The structure that is seen, however, is another matter. The movie is a mechanical way of rolling up the world in a sequence of small still shots, not unlike the way in which print captures the movements of an author's mind in a sequence of black and white still shots. Played back, these still shots recreate or reconstruct an earlier action. The movie has built-in perspective and is superb in details to fill in the pictorial space of its perspective. In contrast, the T.V. image is a continuously formed mosaic with no still shots, no reconstruction of actions, no perspective and very little detail. The T.V. mosaic is so poor in data, in fact, that it must be mostly filled in by the viewer. And moreover it has no light

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on, but only light through. So that, typically, the T.V. viewer is conditioned to expect much activity and to expect knowledge to be a kind of total revelation or illumination from within both subject and himself. As Dr. Ruhe of the Kansas City Medical Center pointed out, T.V. in medical instruction has shown (a) that the speaker, instructor, or lecturer must efface himself, and (b) that the viewer, in operations for example, was less a spectator than the scalpel. The viewer does not so much see as do the operation. Even the surgeon watching the monitor while actually performing the operation frequently is surprised by aspects of the operation which the T.V. camera picks up beyond his immediate visual range. Or rather the operation is translated into another medium, and so revealed in another mode, much as the newspaper translates our ordinary social and political lives into a special mode, providing quite new dimensions and meanings for them.

Let us say, then, that T.V., like radio, states much less than it suggests. That is the symbolist or do-it-yourself phase of this electric medium. Book and film, in contrast, state very fully and suggest much less than electric media. That is another way of saying that electric media deal with experience in depth, rather than spelling it out on the single plane of flat statement. The radio listener takes for granted the action of providing a visual world for the sound experiences. The T.V. viewer must have an image he can complete for himself. So that even persons appearing on T.V. must not be too definite or one-sided types. The vague, ambiguous, uncommitted person, whether in politics or entertainment, will survive on T.V. But the definite classifiable figure who satisfies the film or newspaper medium as a right guy will frustrate the T.V. viewer who wants to complete his own image. The flood of Jack

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Faare, Mort Sahls, Shelley Bermans, has scarcely begun. But a similar non-committal, ironic whimsicality will appear more and more, not only in T.V. figures, but will evoke many persons and forms of expression, not directly related to T.V. The newspaper man and reader are just as baffled by these changes emanating from T.V. depth suggestion as the bookman. Yet a century ago, the poets and painters began to unfold in detail this whole complicated story which has now become part of the educational drama.

The square and the egghead are the bookmen as seen by the new T.V generation. In the sixteenth century, the new book generation saw the oral and oracular previous generation much as Polonius appeared to Hamlet. The razor precision of the oral schoolmen appeared to the new literary humanists as "words words words." They called the schoolmen not squares, but dunces.

The new criticism (or reading in depth) which has appeared in our electronic era is often called scholastic in form by the literary humanists. Is it not terribly wasteful of values and opportunities, as well as destructive of harmony that unwittingly men should so embroil themselves in civil feuds arising from media change? In our age the onset of multiple media changes makes impossible the older patterns of gradual adjustment and oblivion of the absolete. There is no time to adjust. We simply have to know, and understand, exactly what is happening; and indeed, as educators we can avail ourselves of the artists to help us to become contemporaries of ourselves. Rather we must all become creative artists in order to cope with even the banalities of daily life.

Jan. 19/60.
Marshall McLuhan.

S U M M A R Y

I. Role of contemporary art models in predicting new patterns for teaching and learning in the electronic age.

II. The Gutenberg teaching machines and the Renaissance explosion in learning.

(a) The swift decline of dialogue and the seeking of an exclusively visual order.

(b) The rise of the consumer curriculum and the separation of teaching and learning functions.

(c) The "content" as opposed to the "insight" approach to learning.

III. The Nuclear bombardment in learning.

(a) The new electric structures for teaching and learning are basically a return to dialogue, or to the fusion of teaching and learning functions. (Even the Pask, Pressey, Skinner teaching machines are basically dialogue structures.)

(b) The presence of electronic information structures now dominating social and political thought and feeling (electronic tapes have made even the assembly-line absolete) makes the educational adjustment inevitable.

(c) We now switch from subject to inclusive "field" and from light <u>on</u> to light <u>through</u>.

Jan. 20/60
Marshall McLuhan.